DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
MATERIALS ENGINEERING AND TESTING SERVICES
5900 FOLSOM BOULEVARD
SACRAMENTO, CA 95819-4612
PHONE (916) 227-7254
FAX (916) 227-5295
TTY (916) 227-8454

Flex your power!
Be energy efficient!

June 29, 2004

John E. Dewar
Director, Field Operations
California Division
Federal Highway Administration
650 Capitol Mall, Suite 4-100
Sacramento, CA 95814-4708

Dear Mr. Dewar:

Enclosed is the 2003 "Annual Report" submitted by the Independent Assurance Program of the California Department of Transportation (Department) in accordance with Title 23 of the Code of Federal Regulations, Chapter I, Subpart B, Section 637.207(a)(2)(iv). The report summarizes the work done as part of the Department's quality assurance program during calendar year 2003.

Should you have any questions or need further information, please contact Roxanne Cargill, Statewide Coordinator of the Department's Independent Assurance and Reference Sample Programs, at (916) 227-7162, or Terrie Bressette, Chief of the Office of Flexible Pavement Materials in the Division of Engineering Services' (DES') Materials Engineering and Testing Services (METS), at (916) 227-7303.

Sincerely,

Philip J. Stolarski

PHILIP J. STOLARSKI
Deputy Division Chief
Materials Engineering and Testing Services
Division of Engineering Services

Enclosure

c: Jason Dietz, Federal Highway Administration, California Division
Gene Mallette, Department of Transportation, Division of Construction
Chuck Suszko, Department of Transportation, Division of Construction
Terrie Bressette, Department of Transportation, DES, METS
Roxanne Cargill, Department of Transportation, DES, METS

PJS:jmp

CALIFORNIA DEPARTMENT OF TRANSPORTATION
Division of Engineering Services
Materials Engineering and Testing Services
Office of Flexible Pavement Materials
Independent Assurance Program

INDEPENDENT ASSURANCE PROGRAM
ANNUAL REPORT
CALENDAR YEAR 2003

June 29, 2004

Submitted by:

ROXANNE CARGILL, Statewide Coordinator
Independent Assurance and Reference Sample Programs
Office of Flexible Pavement Materials
Materials Engineering and Testing Services
Division of Engineering Services
California Department of Transportation

TERRIE BRESSETTE, Chief
Office of Flexible Pavement Materials
Materials Engineering and Testing Services
Division of Engineering Services
California Department of Transportation

PHILIP J. STOLARSKI
Deputy Division Chief
Materials Engineering and Testing Services
Division of Engineering Services
California Department of Transportation

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Original signed by
ROXANNE CARGILL, Statewide Coordinator
Independent Assurance and Reference Sample Programs
Office of Flexible Pavement Materials
Materials Engineering and Testing Services
Division of Engineering Services
California Department of Transportation

Original signed by Nahid Hosseinzadeh for
TERRIE BRESSETTE, Chief
Office of Flexible Pavement Materials
Materials Engineering and Testing Services
Division of Engineering Services
California Department of Transportation

Original signed by
PHILIP J. STOLARSKI
Deputy Division Chief
Materials Engineering and Testing Services
Division of Engineering Services
California Department of Transportation

CALIFORNIA DEPARTMENT OF TRANSPORTATION
INDEPENDENT ASSURANCE PROGRAM
ANNUAL REPORT – CALENDAR YEAR 2003

June 29, 2004

I. INTRODUCTION

The Federal Highway Administration's (FHWA's) Quality Assurance Procedures for Construction as outlined in Title 23 of the *Code of Federal Regulations*, Chapter I, Part 637, Subpart B, Section 637.205(a) (23CRF637.205(a)), require the following:

> "Each STD [state transportation department] shall develop a quality assurance program which will assure that the materials and workmanship incorporated into each Federal-aid highway construction project on the NHS [National Highway System] are in conformity with the requirements of the approved plans and specifications, including approved changes."

Key components of this quality assurance program are "acceptance" and "independent assurance." Independent Assurance (IA) Programs may be project- or system-based. The California Department of Transportation (Department) has chosen to implement a system-based IA Program.

Agencies choosing to implement a system-based IA Program, as the Department has, are required by 23CFR637.207(a)(2)(iv) to submit an annual report. In fulfillment of this requirement, this report is being submitted concerning the Department's IA Program activities for calendar year 2003.

II. ANNUAL REPORT

The Department's IA Program provides a framework for ensuring that the quality assurance program, as outlined in the Department's *Construction Manual* and in project specifications, is supported by qualified testers and accredited laboratories. It provides for periodic evaluation of the performance of sampling and testing personnel, testing equipment, and testing laboratories. The Department is committed to developing and maintaining qualified testing staff; maintaining calibrated equipment and accredited laboratories; ensuring, when necessary, testers and laboratories that provide test results to the State meet the same standards; and assuring that projects are constructed using quality materials.

The purpose of this document is to provide:

- A brief overview of the Department's IA Program.
- A summary of IA activities from January through December 2003.

The Department's IA Program

Since 1992, the Department has been committed to an IA Program. Guidance for the program is outlined in the Department's *Independent Assurance Program Manual*, which can be located at the following website address:

<http://www.dot.ca.gov/hq/esc/Translab/pubs/Caltrans_IAP_Manual.pdf>

In 1994, the Department shifted from a project-based process for reviewing the testers, equipment, and results to a system-based process. In the system-based process, a tester's qualifications are ascertained by written examinations, witnessed performance of tests, and results of testing on split samples of materials for corroboration of test results. Equipment and laboratories are reviewed annually by the Department's IA staff. This approach removes the necessity of project-specific samples.

In the Department's view, independent assurance is an important and integral part of its quality assurance program but separate from individual projects' quality assurance efforts. Quality assurance at the project level is outlined in the *Construction Manual*, which can be located at the following website address:

<http://www.dot.ca.gov/hq/construc/manual2001/>

In keeping with the requirements of the IA Program and 23CFR637, 6-102C(2) of the *Construction Manual* instructs the construction engineer that:

> "All acceptance testers require certification. No tests or samples are to be taken on Caltrans [Department] projects unless the tester is certified in the test being performed."

Roles and Responsibilities for the IA Program

The roles and responsibilities are divided between the Division of Engineering Services' Materials Engineering and Testing Services (METS) and the districts. In general, METS IA staff are responsible for program development, oversight, implementation, and maintenance of a Reference Sample Program (RSP); certification of district IA staff; record keeping; and review and accreditation of METS laboratories and testers. District IA staff are responsible for tester qualification, laboratory accreditation, and record keeping. The roles and responsibilities are more specifically outlined on the following pages.

- **METS** has overall responsibility for directing and managing the program to include the following:

  - *Developing and Maintaining the Independent Assurance Program Manual*

    A review and revision of the 2001 manual began in 2002. This is a joint effort involving METS, the districts, and the FHWA. Due to staff changes at METS, the revision was placed on hold. However, with the assignment of a new project manager, METS anticipates having the revised manual prepared and submitted to the Department and the FHWA for review and approval by late 2004.

  - *Training and Certifying District IA Staff*

    District staff applying to be certified as district IA staff must attend a two-day training course conducted by METS IA staff (including training in the most recently revised test methods), take and pass written exams on the *Independent Assurance Program Manual*, the IA process, and randomly chosen test methods, and may be witnessed performing some of the tests they will be qualifying other testers to perform. Upon successful completion of all parts, the new district IA staff are issued a certificate valid for one year.

    To maintain certification, district IA staff are required to attend an annual one-day refresher course, to successfully complete a METS review of the district's IA records, and to pass written exams and performance evaluations (witnessing) of some of the test methods they will be certifying.

    In 2003, one of the primary areas of training for the IA staff has been calibration of testing equipment. The Department adopted standards for all equipment that bring the Department's calibration standards into alignment with the AASHTO R-18, "Establishing and Implementing a Quality System for Construction Materials Testing Laboratories." As part of the annual refresher course, district IA staff have been being trained in these standards.

  - *Developing and Maintaining the Statewide Database of IA Staff*

    Districts maintain centralized records of testers and laboratories, and METS staff have always had access to those records. However, with the implementation of QC/QA for asphalt concrete and new specifications for fast-setting Portland Cement Concrete, there has been an increased need for qualifying private testers and laboratories and a need for a centralized statewide database. At this time, METS has established a database on the Internet that provides names and certifications of testers, both State and private, statewide. This database is sorted

by district. Presently the database is being used on a pilot basis by some districts. After input regarding needed revisions has been received from the database users, revisions will be made to the database and it is hoped all districts will then implement use of the database.

METS is working with the Department's Information Technology group to develop and implement an interactive statewide database of tester and laboratory qualification data. This database will be comprehensive, providing historical as well as current information to both the districts and METS.

- *Qualifying Testers and Accrediting Laboratories Within METS*

  METS IA staff provide qualification review, testing, and certification for the METS laboratories and testers that perform quality assurance testing for construction projects. This involves the asphalt concrete, binder, aggregate, cement, Portland Cement Concrete, and source inspection units.

  METS' aggregate, asphalt, asphalt concrete, cement, Portland Cement Concrete, and soils laboratories, as required by 23CRF637, are AASHTO accredited. It is the responsibility of METS IA staff to maintain tester qualifications, laboratory accreditation, and equipment calibration for the asphalt, asphalt binder, concrete, cement, and aggregate testing laboratories such that both the Department's IA and the AASHTO standards are maintained.

  METS continues to provide calibration services for all large equipment within district and METS laboratories and to the local agency laboratories. A METS IA staff person annually calibrates all compactors, presses, and related equipment.

- *Managing the RSP, Including Sample Preparation and Data Evaluation*

  The *Independent Assurance Program Manual* outlines a process by which samples of soil, aggregate, and asphalt concrete are periodically sent to participating laboratories. Statistical analysis of the test results is used to score each laboratory within the general population. Good standing in the RSP is a requirement for a laboratory to be accredited. Data from these reference samples can be used to quantify variability between laboratories to identify precision and bias of particular test methods if the RSP is structured appropriately.

  In 2003, the Department used a consultant's laboratory dedicated to RSP sample preparation to prepare and distribute two round robin samples and one reference sample. The round robin samples were prepared to support the Department's development of a testing procedure to identify asphalt concrete's moisture

sensitivity. The reference sample was asphalt concrete and distributed to 81 State, local agency, and private laboratories.

In late 2003, the Department terminated support of the consultant contract and began establishing a dedicated facility for RSP sample preparation within METS' facilities. It is anticipated that the RSP laboratory will prepare at least two samples in 2004.

- **Districts** have responsibility for the following:

  - *Implementing and Administering the Program at a District Level*

    The IA Program in the districts is the direct responsibility of the District Materials Engineer (DME), a senior-level engineer and supervisor of some portion, if not all, of the district's materials program. Depending on district or region structure, the DMEs are managed by either the Division of Engineering Services or the Division of Construction.

    At the project level, the Department's quality assurance process requires that only qualified testers and certified laboratories provide test results on which acceptance decisions are based.

    On the district level, the IA staff provide annual qualification review of testers and laboratories, review calibration records for equipment, provide corroboration samples and evaluation of the resulting tests, maintain records, and disqualify testers and laboratories as appropriate.

  - *Qualifying Department, Public Agency, and Private Testers and Accrediting Laboratories*

    The district IA staff are responsible for the annual qualification of testers and laboratories that will be providing testing for the Department and, in the case of local agencies, to NHS Federal-aid highway projects. Tester qualification requires successful completion of a written and practical exam for each test method and is valid for one year. All testers must be associated with a laboratory qualified by the Department.

    Laboratory reviews are conducted annually and include reviews of safety procedures and the quality control manual (organizational chart, personnel qualifications, laboratory affiliations, RSP records, test procedures, equipment maintenance, and calibration). METS provides calibration services for district and

local agency large laboratory equipment. Private laboratories are required to use private calibration services.

The district IA staff are responsible for disqualifying testers and laboratories that do not meet the standards of the Department's IA Program. The process for disqualification of testers and laboratories is contained in the Department's *Independent Assurance Program Manual*.

- *Maintaining Records/Files In Accordance With the Independent Assurance Program Manual*

Tester qualification requires successful completion of a written and practical exam for each test method and is valid for one year. The district IA staff maintain all records relating to the qualification process, including the passing and failing status of both written and practical tests for each tester, laboratory reviews, and disqualifications. Currently, there is no central (or statewide) repository for all of this information. It is anticipated the database under development will provide the tool for maintaining and reporting on all aspects of the qualification process.

Shown in Table 1 are the IA records maintained by Headquarters and district staff.

TABLE 1: INDEPENDENT ASSURANCE RECORDS

Category	Item
100	IA Certificates, Form TL-0100 Master List of Qualified Testers in the District, Form TL-0108T Master List of Qualified Laboratories in District, FormTL-0108L
200	Calibration Records IA Calibration and Maintenance Records, Form TL-0112
300	Caltrans Tester Records Tester Log Summary: Form TL-0110 Certificates of Proficiency: Form TL-0111 Witness and Corroboration Samples Forms: TL-0103, TL- 0104, TL-0107
400	Non-Caltrans Testers Records Tester Log Summary: Form TL-0110 Certificates of Proficiency: Form TL-0111 Witness and Corroboration Samples Forms: TL-0103, TL- 0104, TL-0107
500	Qualification of Laboratories Laboratory Quality Control Binders Annual Laboratory Review Letter of Caltrans Qualified Laboratory, Form TL-0113
600	Copies of Reference Sample Program Reports

The Department's IA Program – Numerically

Shown in Table 2 is a summary of the Department's IA staff, certified testers, and accredited laboratories by district. The same data is shown graphically in Figures 1 through 4. The statewide laboratory locations are shown in Figure 5 with the Department's laboratories designated by a star.

The Department has developed California Test (CT) 125, "Methods for Sampling Highway Materials and Products Used in the Roadway Structural Sections," that outlines the sampling requirements and procedures for most materials. While this provides the Department with an opportunity to review and qualify samplers, the results may distort the statistics.

In addition, from this data it seems apparent that some districts have designated only the central laboratory while others have designated remote and temporary materials testing facilities as "laboratories." A uniform definition of "laboratory" and "tester" versus "sampler" needs to be developed to provide an accurate reflection of staffing needs. The revised *Independent Assurance Program Manual* will clarify the definition of these terms.

Also, some tester qualification and laboratory reviews may be conducted across district boundaries with the result that the numbers reflected in Table 2 are not necessarily the number of laboratories that were reviewed by the district IA staff. Some testers and laboratories may have been reviewed by the neighboring district's IA staff. While this does not influence the gross numbers of testers or laboratories that are qualified, it may distort the resource requirements for district IA staff.

TABLE 2: STATEWIDE IA STAFF, TESTERS, AND LABORATORIES

District	Certified IA Staff	Qualified Testers	Accredited Laboratories			
			Caltrans	City/County	Commercial	Total
1	3	28	10	0	0	**10**
2	3	107	8	0	7	**15**
3	3	124	12	0	14	**26**
4	6	610	6	4	38	**48**
5	1	75	11	2	10	**23**
6	2	200	6	2	15	**23**
7	3	239	1	1	22	**24**
8	4	369	2	2	18	**22**
9	1	30	1	0	2	**3**
10	1	54	1	1	6	**8**
11	2	118	1	2	20	**23**
12	3	115	2	0	13	**15**
Districts' Total	**32**	**2069**	**61**	**14**	**165**	**240**
METS' Total	**1**	**43**	**3**			**3**
Total Districts' and METS'	**33**	**2112**	**64**	**14**	**165**	**243**

FIGURE 1: INDEPENDENT ASSURANCE STAFF BY DISTRICT

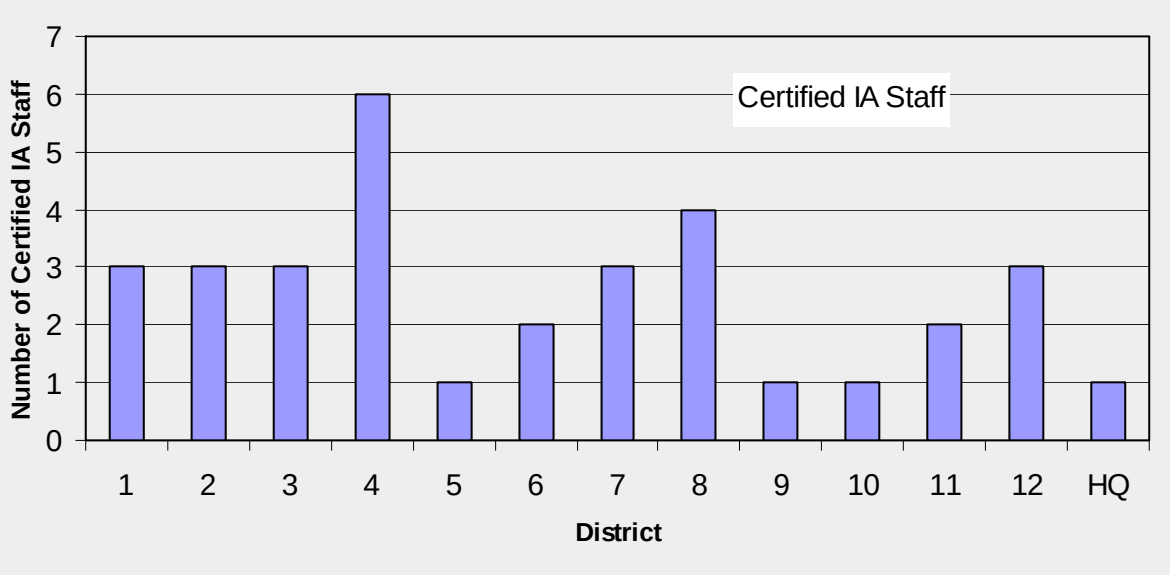


FIGURE 2: QUALIFIED TESTERS BY DISTRICT

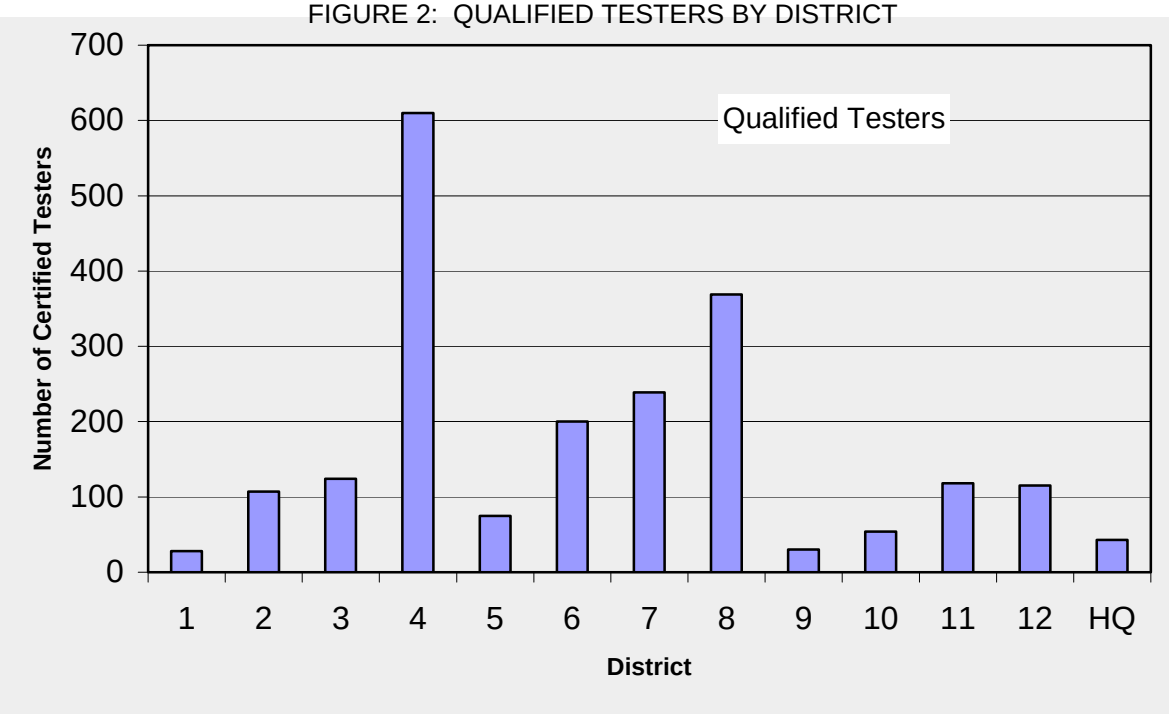


FIGURE 3: ACCREDITED LABORATORIES BY DISTRICT

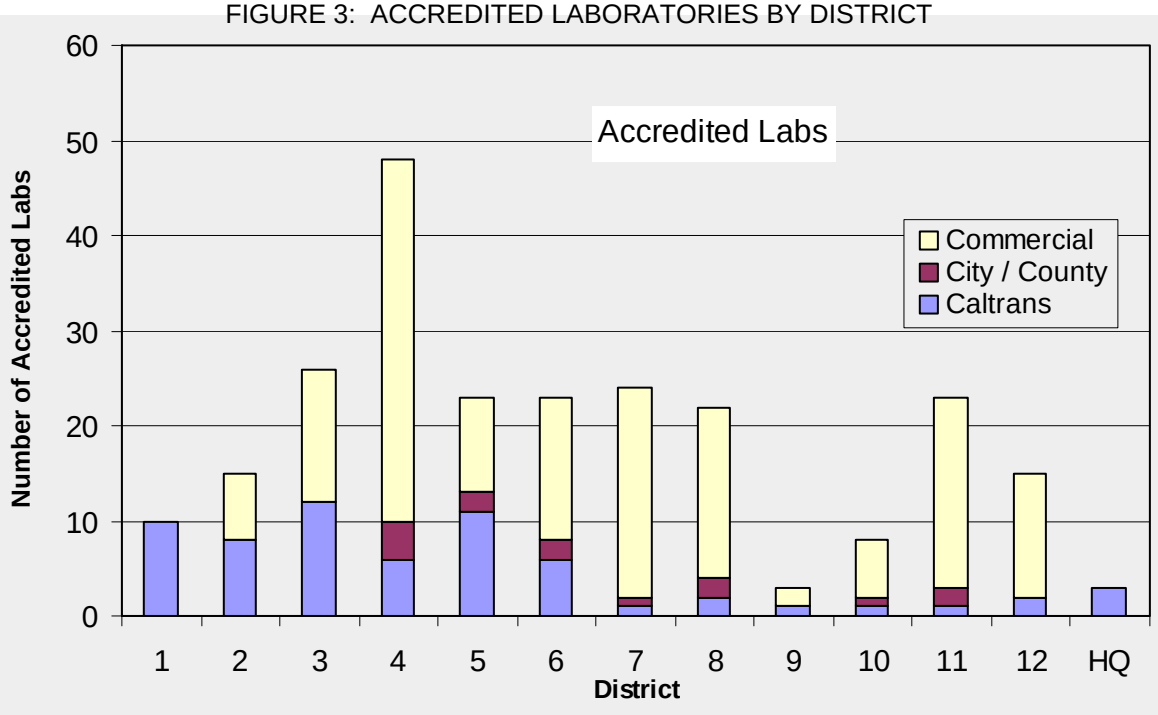


FIGURE 4A: RATIO OF LABORATORIES TO IA STAFF

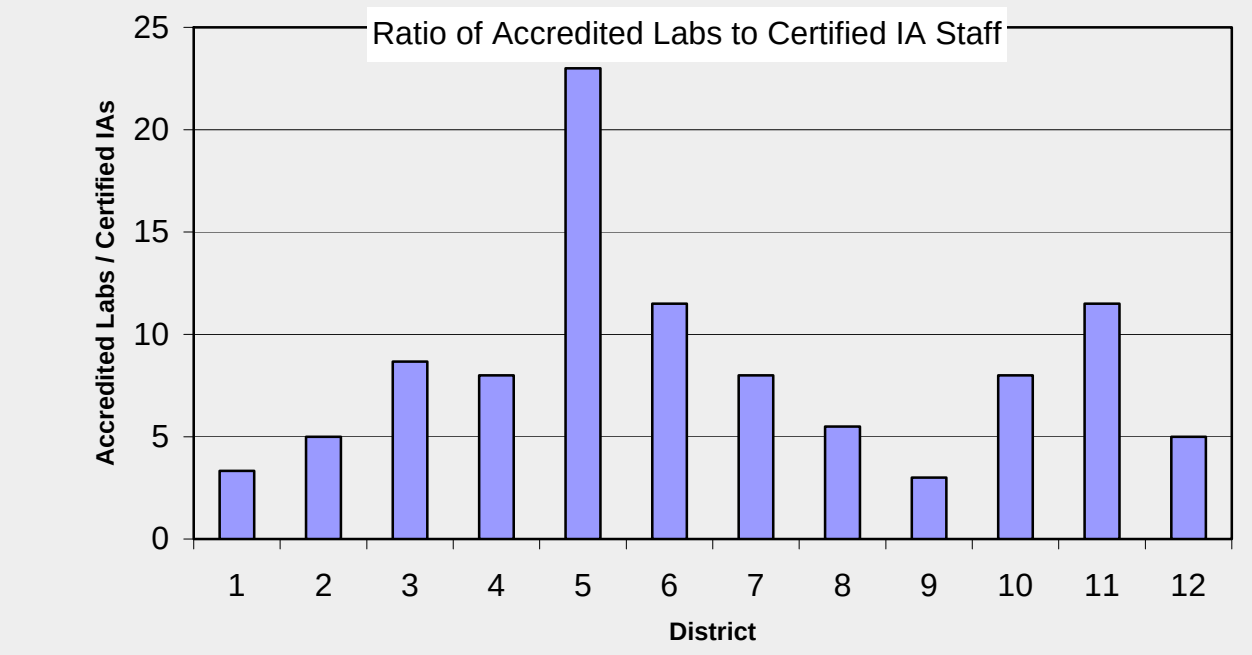


FIGURE 4B: RATIO OF TESTERS TO IA STAFF

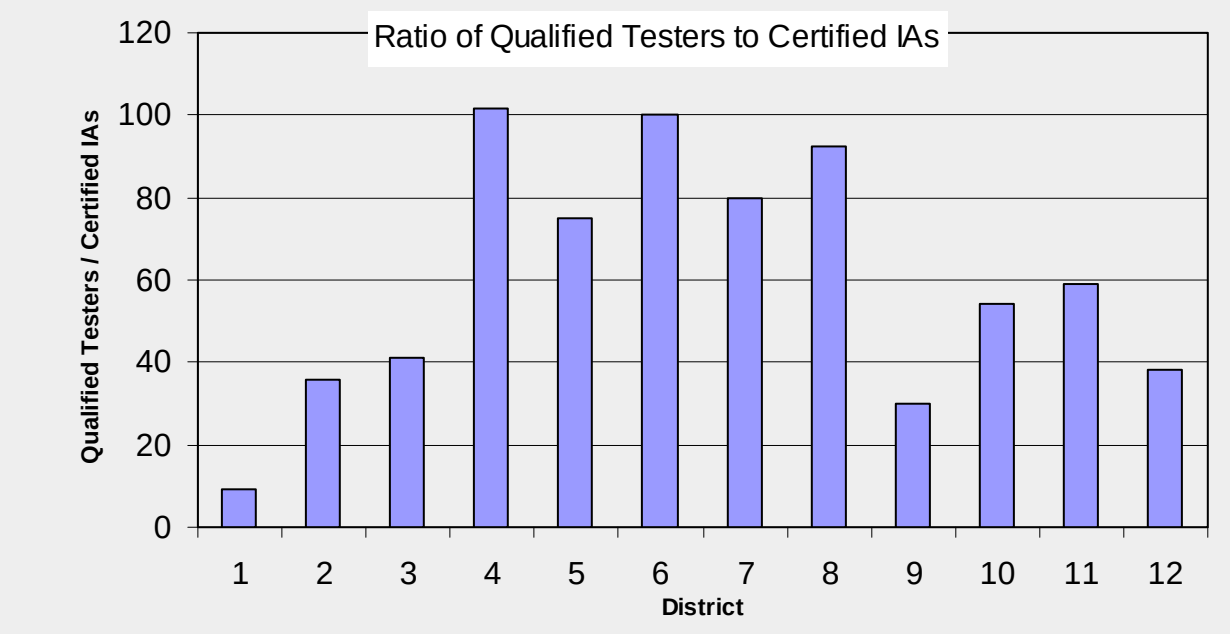
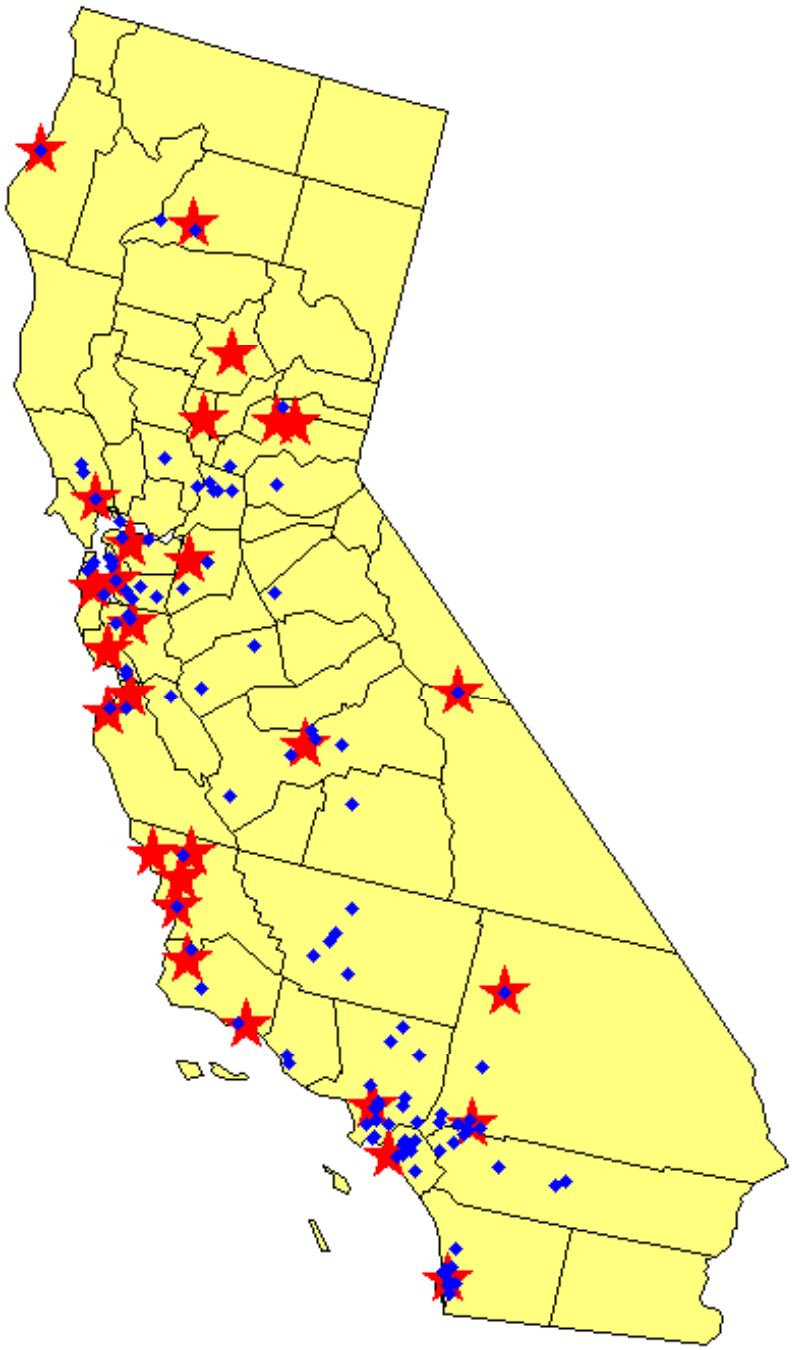


FIGURE 5: LABORATORY LOCATIONS
(DEPARTMENT'S = ★)



III. REVIEW OF THE IA PROGRAM AND MANUAL

In 2003, the Department began review and revision of the IA Program. A review team of DMEs, IA staff, Division of Construction staff, and FHWA representatives met to provide input and to discuss changes that would make the program more effective and efficient.

Notes of those meetings have been passed to the new METS IA project manager. Completion of the revision is a priority for 2004.

IV. SUMMARY OF CALENDAR YEAR 2003 ACTIVITIES

- METS anticipates the revised *Independent Assurance Program Manual* to be prepared and submitted to the Department and the FHWA for review and approval by late 2004.

- Mr. Jason Dietz of the FHWA and METS representatives visited IA and Construction staff in Districts 3 and 4. This was combined with METS' annual review of the districts. The visits were established to provide the FHWA an opportunity to become more acquainted with METS/district relationships, METS' process for annual reviews, and the district IA function.

- In late 2003, the Department sharply curtailed consultant support. Consequently, the RSP laboratory functions were moved from the consultant's facility to METS' facilities. A large enclosed area has been modified to include a shaker room, drying and processing ovens, work surfaces, and storage facilities.

- An asphalt concrete sample was sent in late summer 2003 to 81 laboratories for the RSP. The samples were processed and results were returned to the Department. The data was processed by the consultant. However, laboratory notification and outlier follow-up was caught up in the loss of the consultant's services. Completing this aspect of the RSP will be a priority for 2004.

- METS IA staff trained district IA staff in procedures for calibration of testing equipment according to the new standards. District IA staff will use this training and these standards in their laboratory reviews for accreditation.

- METS' binder, asphalt concrete, asphalt performance, aggregate, cement, Portland Cement Concrete, and soils laboratories received their AMRL/CCRL reviews. METS IA staff provided review of the quality control process and guidance.

- METS technical and IA staff provided training and review for the implementation of CT 371, "Method of Test for Resistance of Compacted Bituminous Mixture to Moisture Induced Damage," (test for moisture susceptibility for asphalt concrete mixes). The result of their efforts was qualifying over 40 testers and accrediting 20 laboratories.

For additional information and/or clarification on this report, please contact Roxanne Cargill, Statewide Coordinator of the Independence Assurance Program, at (916) 227-7162 or via e-mail sent to <roxanne_cargill@dot.ca.gov>. Terrie Bressette, Chief of the Office of Flexible Pavement Materials, also may be contacted at (916) 227-7303 or via e-mail sent to <terrie_bressette@dot.ca.gov>.